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Dated: June 28, 2007

Signature: 

(Thomas J. Engellenner)

Docket No.: 101328-0177  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Qing Hu et al.

Application No.: 10/661,832

Confirmation No.: 7715

Filed: September 12, 2003

Art Unit: 2828

For: METAL WAVEGUIDES FOR MODE  
CONFINEMENT IN TERAHERTZ LASERS  
AND AMPLIFIERS

Examiner: T. T. Van Roy

**REPLY BRIEF PURSUANT TO 37 C.F.R. §41.41**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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**I. REAL PARTY IN INTEREST**

The real party in interest is the Massachusetts Institute of Technology ("MIT") located in Cambridge, Massachusetts. MIT derives its rights in this application by virtue of an assignment of the application by inventors thereto.

**II. RELATED APPEALS AND INTERFERENCES**

None.

**III. STATUS OF CLAIMS**

Claims 1-18 are currently pending in the present application, Serial Number 10/661,832. According to the Final Office Action mailed on February 21, 2006, each of the claims 1-18 stands finally rejected. Accordingly, claims 1-18 are subject to this appeal.

**IV. STATUS OF AMENDMENTS**

No amendments have been filed subsequent to the final rejection.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

A summary of the claimed subject matter is contained in Appellant's appeal brief filed on December 7, 2006.

**VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The grounds of rejection were described in the aforementioned Appellant's appeal brief.

**VII. RESPONSE TO THE EXAMINER'S REMARKS**

In response to Appellant's arguments presented in Appellant's appeal brief, the Examiner asserts that although he does not dispute that the upper end of the claimed range (i.e., 300 microns) is an order of magnitude greater than the lasing wavelengths in the examples provided by Unterrainer, the claimed range limitation (i.e., about 1 to about 10 THz corresponding to a range of

about 30 to about 300 microns) as a whole must be considered. As such, the Examiner asserts that “Unterrainer teaches in multiple sections of the article that the double metal-semiconductor waveguide is fit for use at longer wavelengths, and would have improved performance at those wavelengths.” Hence, the Examiner concludes: “it is believed that one of ordinary skill in the art would find Unterrainer’s teachings do in fact motivate use at those extended wavelengths.”

In reply, Appellant notes that although Unterrainer indicates that its calculations show that a quantum cascade laser having a double-metal waveguide and operating at 21 microns exhibit “a very high confinement factor,” its experimental data comparing the performance of a QCL having a double-sided metal waveguide with one having a single-sided waveguide (both at an operating wavelength of 21 microns) shows a worse performance for the QCL having the double sided metal waveguide over a wide temperature range (See Figure 2 of Unterrainer, which is reproduced in Appellant’s appeal brief).

The Examiner, however, characterizes the experimental data as demonstrating “closeness in operation of these preliminary devices to those of the known single-sided devices in order to motivate their potential use at increased wavelengths.” In reply, Appellant respectfully submits that the experimental data would in fact dissuade one of ordinary skill in the art from using the double-sided metal waveguide, as it shows a *worse* performance for the tested double-metal waveguide. The Examiner, however, suggests that notwithstanding the exhibited worse performance of the double-sided metal waveguides, Unterrainer’s statement regarding the usefulness of such waveguides at longer wavelengths would motivate one of ordinary skill to use them at longer wavelengths.

Although Unterrainer makes a conclusory statement that the performance of the double-metal waveguides should improve with wavelength, it does not provide any experimental evidence for this claim. In fact, it conjectures that the worse performance of the tested QCL having a double-sided metal waveguide is attributable to factors such as heating problems due to the decreased thermal properties of the double-sided metal waveguide, rather than the laser’s operating wavelength.

In sum, Appellant respectfully submits that one of ordinary skill in the art familiar with the teachings of Unterrainer would simply adopt the single-sided metal waveguide, which Unterrainer's experimental data shows to perform better.

## VIII. CONCLUSION

For the reasons noted above, Appellant submits that the pending claims define patentable subject matter. Accordingly, Appellant requests that the Examiner's rejection of these claims be reversed and that the pending application be passed to issue.

Dated: June 28, 2007

Respectfully submitted,

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